

**SCIENCE-PARK, LOCAL ECONOMIC DEVELOPMENT POLICY, AND
EMERGING ROLE OF CITY IN THE NETWORK SOCIETY – A
COMPARATIVE STUDY OF TWO SCIENCE-PARKS IN TAIWAN**

Yi-Der LEE*, Louis ALBRECHTS[♦], Joseph R.F. HSU[▲]

Abstract

In Taiwan, the first science park – Hsinchu Science-based Industrial Park (HSIP) has successfully displayed its contribution on the development of high-tech industry and national economic growth. Its performance encouraged the state to establish a second science-park – Tainan Science-based Industrial Park (TSIP), to pursue further development of hi-tech industry. In this paper, we study the second science park in Taiwan with specific concern on the emerging role of local government and private sectors in the development of TSIP. A comparative study between two science parks from the above-mentioned perspectives is provided.

* Doctoral student at Institute for Urban and Regional Planning (ISRO), Catholic University Leuven, Kasteelpark Arenberg 51, B-3001 Leuven, Belgium. Tel: +32-(0)16-32.13.33. Email: Yider.Lee@asro.kuleuven.ac.be

[♦] Professor at Institute for Urban and Regional Planning (ISRO), Catholic University Leuven, Kasteelpark Arenberg 51, B-3001 Leuven, Belgium. Tel: +32-(0)16-32.13.35. Email: Louis.Albrechts@isro.kuleuven.ac.be

[▲] Director of Science & Technology Division, Taipei Representative Office in Belgium, Boulevard du Régent 40, B-1000 Brussels, Belgium. Tel: +32-(0)2-517.17.31. Email: Joseph.Hsu@skynet.be

Introduction

Cities, as many have claimed, are increasingly becoming critical agents of economic development in the context of globalization. In search for the new sources of economic growth that would help to enhance cities' competitiveness, science-park is often considered as one of the favorable strategies.

In Taiwan, the first science park – Hsinchu Science-based Industrial Park (HSIP, established in 1980) has successfully displayed its contribution on the development of high-tech industry and national economic growth. Its performance encouraged the state to establish a second science-park – Tainan Science-based Industrial Park (TSIP) in 1996, to pursue further progression of Taiwan's high-tech development. For the state, developing science-park is viewed as an instrument to establish an innovative milieu of regional development. For city governments, more recently, science-park is seen as 'panacea' for the declining local economy and the consequent problems of their cities. Within different context, the paper argues that the TSIP is not the duplicate of HSIP, but another version of science park development in Taiwan, since the city-level governments actively participated in the planning process of the second science-park.

The purpose of this paper is, through the comparative study of the two science-parks in Taiwan, to discuss the emerging role of city-level government in the field of local economic development. The paper covers three parts. A quick review of local economic development policy in the era of globalization is placed in the first part. A comparative study between these two science parks constitutes the second part of the paper. It is conducted from two perspectives: the transformation of state's dominant role in the development of science park and the active participation of local government in the planning process of science park. Derived from the comparison, some implication for the planning and challenge for the city government are provided in the last part of the paper.

Economic globalization, cities, and local economic development policy

The increasing globalization of economic activities has been the most significant development in the world economy during the past few decades. The term 'globalization' has been seen at the heart of economic and political discourse. One of the main themes in contemporary literature concerning the study on globalization is the increasing competition among cities. Cities everywhere are highly and increasingly tied into a system of global competition (Hall and Pfeiffer, 2000). The logic of such competition, as Harvey (1989) has highlighted, is associated with economic globalization. Economic globalization, on the local level, together with the improvement of communication technology, signifies the increasing mobility of capital that allowed capitalists to overcome spatial constraints (Harvey, 1989). Paradoxically, this goes hand in hand with an increased sensitivity to territory, especially to cities that are potential sites for investment and for living (Moulaert, 1997; Le Galès, 1998). Within this framework, cities become engaged in a struggle to get noticed, to capture for themselves an advantage over rival cities (Harvey, 1989). In reacting to competition among cities, strategies such as city marketing, large-scale projects, international airport, and modern public transport system (metro or tram), are pursued by many of the

city authorities around the world. Such strategies and policies mentioned above are termed by some scholars as New Economic Policy (NEP) or New Urban Politics (NUP) that *'is completely in tune with the liberal stance supporting the globalization thesis'* (Cox, 1995; Moulaert, 2000). Science or technology park, for instance, can be seen as a kind of large-scale urban development project, which is also part of the cocktail package of New Economic Policy. Together with special fiscal measures that are aimed to stimulate investments in new technologies, it is expected that the science park will produce new urban prosperity in terms of job creation and income generation.

Nevertheless, for city-level government, to implement a science park is not an easy task. Taking Hsinchu Science-based Industrial Park (HSIP) as an example, the central government has allocated around US\$912 million for the HSIP over the past 21 years (Administration of Hsinchu Science-based Industrial Park, 2003). This is far beyond the capacity of city-level government to establish a science park by itself. However, we are not suggesting that city government should not pursue the capital-intensive development project, like science park. Instead, we argue that close cooperation between local and national government is necessary for the success of any effort geared to develop local economy, especially in countries where decentralization is in a state of transition. In the following sections, we will use Tainan Science-based Industrial Park as a case to show how city-level government actively involved in the planning process of Taiwan's second science park in comparison with HSIP which is entirely a state-led initiative.

The birth of second Science-based Industrial Park – Tainan Science-based Industrial Park (TSIP)

TSIP is situated approximately 12 kilometers northeast of Tainan city, between the two towns of Hsinshih and Shanhua. The plot has been divided into two bases for developing. The development of the First Base covers approximately 638 hectares, while the Second Base encompasses 400 hectares. For a better living environment, an additional 2244.82 hectares surrounding the TSIP will be developed by the Tainan County Government as "Tainan Science Park Special Zone". It is approximately 30 minutes from TSIP to Tainan Airport and about one hour to Kaohsiung International Airport and Kaohsiung Harbour. Within 5 years, the planned Southern Second Freeway will have interchanges at both Shanhua and Hsinshih, effecting convenient connections with Tainan's road network infrastructure. Together with the planned High-speed Rail System and the Tainan MRTS (metro) extension, the accessibility of TSIP will be largely enhanced (Administration of Tainan Science-based Industrial Park, 2003).

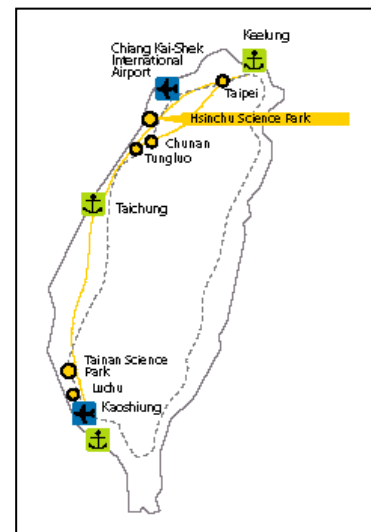


Figure 1: Location of TSIP

The idea of establishing the second science-based industrial park was proposed by the National Science Council (NSC) to the Executive Yuan in 1990. It was aimed to provide more land to meet the growing need from companies in HSIP where the land acquisition process for the third phase expansion did not go well resulting from increasing land price. Later after NSC proposed the idea to Executive Yuan, in the same

year, Graduate Institute of Building and Planning in National Taiwan University and a private consultancy were entrusted to proceed the feasibility study for the second park.

In 1991, the Taiwan Cabinet announced the Six-Year (1991-1996) National Development Plan which covered 775 major national infrastructure (i.e. nuclear power plant) and other administrative projects with the total budget up to NT\$ 8.23 trillion. Within this plan, establishing a second science-park was listed for the first time as one of the national projects aimed to accelerate the hi-tech industrial development and to balance the uneven development between northern and southern Taiwan. However, if we look carefully into the written report of the Six-year National Development Plan, the policy of establishing a second science-park was put behind the policy of expanding the first science-park in Hsinchu City. A member from the feasibility study for the second park research group comments:

The priority of the state was to complete the expansion of Hsinchu science-park. Establishing a second science-park in the long term might be necessary; in the short term, it was applied as kind of strategy to enhance the bargaining power of the state vis-à-vis the landlords who were considered as hindrance for the expansion of the Hsinchu science-park. (Yang, 1998)

Therefore, we can say that the dominating rationality of setting up a second science park is to accommodate the growing needs of high-tech firms rather than to alleviate the uneven development between regions in Taiwan.

The selection of site for the second science-park

Based on the experience of other science-parks within and outside Taiwan, the research group of 'feasibility study of the second science-park' set up criteria for the locational choice of the second science-park, and informed 10 county governments to propose suitable sites that would meet those criteria in 1991. The criteria were:

1. Minimal size of possible site must be over than 300 hectares with no difficulty for land acquisition;
2. The average gradient of site must be lower than 30%, with stable earth stratum;
3. The amount of daily water supply must over 36,000 tons;
4. The distance between possible site and the metropolitan center must be reached within 45 minutes by car; research institutes and universities in the neighbouring area are also required;
5. The possible site must not locate in the special agricultural zone and water-source protected zone.

Due to the doubt on central government's decision to develop a second science-park, only 8 county governments proposed 11 sites for further selection.

After acquiring the basic data of proposed sites, the research group started to construct the analysis model. 'Multiple Criteria Decision Making' method was adopted to assess the proposed sites. Hsinshih, the site proposed by Tainan County was indicated as the optimal choice when the feasibility study for the second park was completed in February 1993. However, the NSC did not reveal the final result which was based on a

rational analysis process to the public. This was because the NSC did not want to face the pressure from local governments and members of parliament alone, while the policy of establishing a second science-park still in an uncertain situation.

From the 'Second' to 'Southern' Science-based Industrial Park'

In July 1993, the Executive Yuan approved an economic revitalization programme, which calls for the establishment of a southern Taiwan science-based industrial park. Thus a task force was organized in January 1994 to make preliminary studies of the location, the kind of industries to be introduced, the required facilities and services. Besides, the definition of the 'southern Taiwan area' had been further clarified, which reduced the previous 11 candidate sites into 5 sites in Tainan County, Chiayi County, Yunlin County, Kaohsiung County, and Pingtung County.

When the policy of establishing the southern science-park becoming clearer, with the professional support from the Department of Urban Planning in National Chen-Kung University, Kaohsiung County proposed another site with a new plan named 'Twin-Star Plan' to replace the originally proposed site which was considered as less preferable site in the 'feasibility study of the second park' report.

The competition between Tainan and Kaohsiung County

In July 1994, the NSC gave up the land acquisition in Hsinchu County for the third phase expansion plan of the HSIP and turned into the site-selection work for the Southern Taiwan Science-based Industrial Park. Eventually, sites in Tainan County and in Kaohsiung County were left for further selection after some fieldwork done by NSC.

In September 1994, the NSC commissioned a team with nine experts to make recommendations on the selection of a site for the science-based industrial park. Both Tainan and Kaohsiung Counties was informed and agreed on the proposed members for the site selection commission. On 15th of January in 1995, Hsinshih in Tainan County was recommended by the committee as the final choice. And a month after, the Executive Yuan approved this selection. Upon receiving approval from the Executive Yuan, the NSC proceeded with construction plans and designated the project as the "Tainan Science-based Industrial Park", or "TSIP".

The development of TSIP in comparison with HSIP

In Taiwan, the first Science-based Industrial Park in Hsinchu city (HSIP) is a state-led (central government) project with more than 20 years of experience. Its continuous growth in terms of revenue and investment (see Table 1) has been recognized as a successful model science park development (Lin, 1997). HSIP was reported in the Business Week (in May, 1996) as the 'Silicon Valley in Taiwan' and awarded by the 'Site Selection Journal' as the 'most efficient science park' in the world (Chineseworld.com, 16/12/1997).

The successful experience of HSIP is expected to be duplicated on the TSIP, just as HSIP copied the model from Silicon Valley and Stanford Research Park in the early 1980s. In the case of HSIP, the state, with its authoritative characteristic, had absolute

power over the development and operation of the park, which allowed the state to provide common production factors for the development of high-tech industries in a very active and efficient way. However, this could not be the case for the development of TSIP for some reasons. Firstly, a process of systemic change from a developmental authoritarian dictatorship to a representative democracy has undergone since the mid-1980s (Domes, 2000). Though the central government remains highly centralized, local governments are now strongly involved in the political decision-making while more and more popularly elected mayors of the cities and counties, in their new positions, emphasizing their constitutionally guaranteed right of co-determination on local development issues. Therefore the local governments were involved from the beginning of planning processes of the second science park, which never happened in the case of HSIP. Secondly, the engine for the development of TSIP is the private sector, rather than the state, since companies have grown rapidly through the past 20 years and many of them are playing leading roles in the international high-tech industry. From these two perspectives, we could say that the development of TSIP is different from the one in Hsinchu.

Table 1: Growth of companies, investment, combined sales and number of employees in HSIP

Year	Number of Firms	Investment (NT\$ Hundred Million)*	Sales (NT\$ Hundred Million)*	Number of employees
'81	17	7.2	N/A	N/A
'82	26	11.6	N/A	1,216
'83	37	19.6	30	3,583
'84	44	32.3	95	6,490
'85	50	40.6	105	6,670
'86	59	57.1	170	8,275
'87	77	105.6	275	12,201
'88	94	158.3	490	16,445
'89	105	282.2	559	19,071
'90	121	426.9	656	22,356
'91	137	551.1	777	23,297
'92	140	628.3	870	25,148
'93	150	668.9	1,290	28,416
'94	165	935.0	1,778	33,538
'95	180	1,477.0	2,992	42,257
'96	203	2,585.0	3,181	54,806
'97	245	3,756.5	3,996	68,410
'98	272	5,106.3	4,550	72,623
'99	292	5,660.2	6,509	82,822
2000	289	6,944.8	9,293	96,642
2001	312	8,588.2	6,613	96,293
2002	334	9,100.0	7,041	98,616

Source: Hsinchu Science-based Industrial Park official website (<http://www.sipa.gov.tw>, 10/03/2003)

*: 1 Euro = NT\$ 36-38

The transformation of state's dominant role in the development of science park

According to the statistics in 2002 (see Table 1), there were 334 high-tech companies in the HSIP, with total sales of US\$190 hundred million. Comparing to the data in 1981, HSIP is really a fast growing science park. Among the industries in HSIP, integrated circuit (IC) and computers-peripheral industries are the two main industries in the HSIP. Due to the rapid growth of these two main industries and other high-tech industries, HSIP can no longer satisfy the growing needs of companies, especially in terms of land provision. The urgent demands of companies had forced the state to set up a second science park while the third-phase expansion of the HSIP was hindered by the landowners at that time.

Table 2 shows the total number of companies and investment in TSIP. According to the statistics, most of the investment (91.3% of the total investment) in TSIP is contributed by IC related companies (especially IC manufacturing) that has already operated in HSIP. One may interpret the development of TSIP at this phase as the extension of HSIP. Besides, large-scale IC manufacturing is the leading industry at the first-phase development of TSIP, which is different from the pattern of HSIP's early development that most of the companies were with rather small scale from the beginning.

As mentioned before, private sector is the main engine for the development of TSIP while the government (both central and local) functioning as the facilitator by providing physical infrastructure and services. IC related industries, with their previous experience in HSIP, have expanded their production activities to the TSIP, which can be regarded as the locomotive industry for the development of TSIP. This has made the development pattern of TSIP different from the one in HSIP which was from zero to its successful now.

Table 2: Total number of companies and investment in TSIP

Industries	Expansion of companies in HSIP		New companies		Total	
	Number of company	Investment (NT\$ Hundred Million)*	Number of company	Investment (NT\$ Hundred Million)*	Number of company	Investment (NT\$ Hundred Million)*
Integrated Circuits	16	12019.7	5	100.1	21	12119.8
Optoelectronics	3	95.6	23	690.4	26	785.9
Biotechnology	2	7.5	16	118.8	18	126.3
Telecommunications	2	13.8	12	48.2	14	62.0
Precision Machinery	2	11.4	17	59.5	19	70.9
Computers and Peripherals	0	0.0	1	1.6	1	1.6
Total	25	12147.9	74	1018.6	99	13166.5

Source: Tainan Science-based Industrial Park official website (<http://www.tnsipa.gov.tw>, 10/03/2003)

*: 1 Euro = NT\$ 36-38

The active participation of local government

The participation of local government in the development of science park is not new for most developed countries. For Taiwan, however, this is the first time that local governments have a say in the history of science park development. Besides, while most of the studies on the economic development in East Asia emphasize the strong intervention from the state, little attention is placed on the role of local government, especially in the field of high-tech industry development. In this section, we explore why and how local government participated in the planning processes of TSIP.

■ *The meaning of TSIP to local government*

Tainan County is a county located in southern part of Taiwan, with a population of 1.1 million and a total area of 2016 km². It is a second-tier city in terms of administrative level. In reality, it is a city that has long been excluded and ignored under the national policies and the domination of Taipei City in the northern Taiwan. With agricultural and some other obsolete industries supporting the economy of the county, Tainan County is facing problems, such as the loss of population, declining economy and poor condition of county government's annual revenue¹. Like other second-tier cities in Taiwan, Tainan County was eager to transform its industrial structure when Taiwan's economy had become more integrated into the world economy.

In 1993, when the central government announced the policy to establish a second science-based industrial park in southern Taiwan, people in Tainan County acknowledged that this would be a good chance to transform the industrial structure which could also provide more jobs and revenue for the Tainan County. Thus the whole county was mobilized to make the second science-based industrial park to be located in Tainan County. Under the severe competition with Kaohsiung County, the Tainan County eventually won the bid.

The competition between cities over Science Park reflects the phenomenon in Taiwan that for local governments and people, large-scale economic and infrastructure projects are often considered as the most direct and efficient instruments to facilitate local development and to transform existing industrial structure. This is because that most of the resources are still at the hands of central state, which leaves local governments limited space for manoeuvre on local economic development.

■ *Local government with limited autonomy*

Due to the political transformation in Taiwan during the last two decades, the top-down way of decision-making process over large-scale infrastructure projects and national

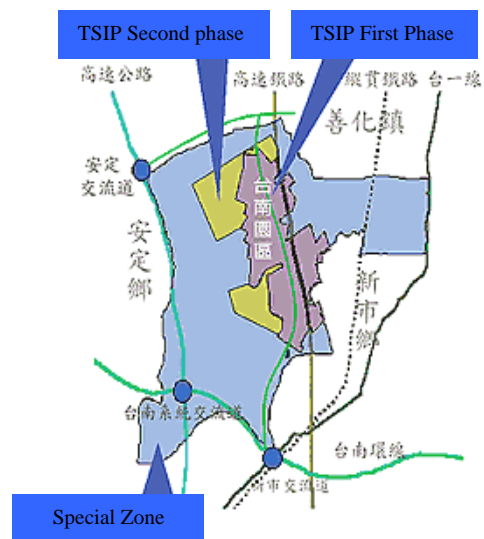


Figure 2: TSIP and Special Zone

¹ The revenue per capita of Tainan County in 2000 was NT\$ 23,085. The average in Taiwan was NT\$ 35,305, while Taipei City was NT\$ 84,054.

economic development projects is no longer applicable. But this does not mean that the active participation of local government on the planning and development of Science Park is guaranteed. It is rather a politically symbolic presentation because the state is still centralized. But the local government – Tainan County government in the planning process of TSIP, did know how to exercise its limited power on urban planning and the allocation of public facilities (i.e. water and electricity supply) to assert its right in the planning of TSIP. Furthermore, the Tainan County government also negotiated with the National Science Council (NSC) on the future prospective of TSIP and its relationship with Tainan County. This can be seen from the overall plan of TSIP where the development of Science Park is not the only concern of NSC, but with the creation of a sustainable Science City as the long-term goal which is expected to create a win-win situation between the TSIP and Tainan County (Wang, 1997).

In doing so, the local government proposed ‘the Plan for Tainan Science-based Industrial Special Zone’ covering 2244.82 hectares surrounding the TSIP. More than providing an area with convenient transportation system and efficient business service system for the better functioning of TSIP, the Special Zone is also regarded by the local government as a strategy and a catalyst to transform the industrial structure and images of surrounding towns; and to valorize the local real estate market, which would then in turn increase the revenue of local government. However, the impact of the TSIP and Special Zone is still too early to be judged. It might take 15 to 25 years for the full impacts to become evident, since the spatial development is organic in character (Lin, 1997).

Conclusion

Retrospectively, many studies have addressed the contribution of state’s intervention in Taiwan’s high-tech industry development. Among state’s policies, the first science park – HSIP has played a key role in the development of high-tech industries, and is regarded as the heart of Taiwan’s high-tech industry. The successful experience of HSIP encourages the state to develop a second science park as an important strategy to facilitate the development of Taiwan’s high-tech industries.

In this paper, we argue that the TSIP is not merely a copy of HSIP. With its different characteristics and development pattern, TSIP has provided a new version for the development of science park in Taiwan. And we examine the difference between HSIP and TSIP from two perspectives. First, with more than 20 years of development in HSIP, many of the high-tech firms are now playing leading roles in the global market. This has made the private sector more active and involved in the planning processes of TSIP. Although the state remains crucial, its dominating position in the development of TSIP has been loosened by large hi-tech firms.

Second, in terms of the planning and development of TSIP, the local government has played a more active and supportive role. Local governments were involved from the very beginning phase of establishing a second science park by providing possible sites. And then a site-selection mechanism was created to assure that cities are competing each other in an equal, fair and transparent framework. This shows us that the decision-making of national economic projects, especially those with growth pole

effect on regional development, can no longer be operated in a top-down and authoritative way by the state, since the local governments have acknowledged that their constitutionally guaranteed right of co-determination on any national project that may have impact on local development.

Besides, through the strategic exercise of their limited power, local governments can also be very influential on any project happening on their locality. We found that the Tainan County government played a proactive and supportive role in the case of TSIP by planning the Special Zone to reserve land for TSIP's possible expansion in the future; to provide public good such as housing, schools and recreation facilities; to prevent and minimize the possible undesired impact (i.e. traffic jams); to use TSIP as a driving force to alter the existing industrial structure to promote Tainan County's position in the global economy; and to assure that the TSIP will be integrated into the local community rather than as an isolated 'rented place' in Tainan County.

Therefore, it is not enough to study Taiwan's second science park only from the perspective of state's intervention. We suggest that the study on the relationship and interaction between the state, private sectors and local governments can provide other dimensions for a better and deeper understanding on the science park development in Taiwan and those in other late-industrialized countries.

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